Abstract

A method and apparatus for extracting the vector optical properties of biological samples with micron-scale resolution in three dimensions, using polarization-sensitive optical coherence tomography (PS-OCT). The method measures net retardance, net fast axis, and reflectivity. Polarization sensing is accomplished by illuminating the sample with at least three separate polarization states, using consecutive acquisitions of the same pixel, A-scan, or B-scan. The method can be implemented using non-polarization-maintaining fiber and a single detector. This PS-OCT method reported measures fast axis explicitly. In a calibration test of the system, net retardance was measured with an average error of 7.5° (standard deviation 2.2°) over the retardance range 0° to 180°, and fast axis with average error of 4.8° over the range 0° to 180°.

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